INNOVATIVE APPROACHES AND MINERAL WATER PRODUCTION — THE SIGNIFICANCE OF THE CHST44 WELL AS A SOURCE OF HIGH-QUALITY MINERAL WATER

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Annotation

This article is dedicated to the quality, geological features, and production potential of mineral water extracted from the CHST44 well located in the Khanabad district of Andijan region. The geological conditions of the well, the chemical composition of the water, mineralization level, hardness index, and pH balance have been analyzed, highlighting its advantages as a source of drinking and mineral water. The efficiency of the well, pump technologies, and exploitation methods have been recommended, emphasizing the importance of sustainable water resource management. Additionally, detailed information is provided on the positive effects of the minerals in the water on human health, including strengthening bone and dental health, improving gastrointestinal function, and detoxifying the body. This research encompasses important scientific approaches aimed at the effective utilization and economic and ecological development of mineral water resources.

Keywords: CHST44 well, mineral water, geological conditions, water mineralization level, water pH index, calcium and magnesium, drinking water, water resource management, gastrointestinal system, ecological sustainability.

The demand for high-quality drinking and mineral water resources is steadily increasing worldwide. This issue is not only related to ensuring public health and ecological sustainability but also plays a significant role as one of the key factors in economic development. The availability of safe and high-quality drinking water is essential not only for maintaining human health but also for guaranteeing successful operations in sectors such as manufacturing and agriculture.

Although Uzbekistan is rich in water resources, in certain regions, there is a pressing need to improve the quality and volume of drinking water through the implementation of new technologies and the identification of additional water sources. The CHST44 well, located in the Khanabad district of the Andijan region, is one of the key projects addressing this issue. This well's water resources are intended for use as drinking water, with its physical, chemical, and biological characteristics capable of fully meeting the needs of the local population.

The CHST44 well has been identified as a source of mineral water through drilling operations, demonstrating substantial potential for the production of both drinking and mineral water. The water extracted from this well, characterized by its mineralization level, hardness index, and pH balance, is deemed safe and beneficial for human health. Furthermore, this project contributes to the efficient management of water resources, improvement of the quality of life for the population, and enhancement of economic opportunities.

This article is dedicated to analyzing the outcomes of the drilling operations conducted at the CHST44 well and exploring the potential of its water resources. The study extensively examines the geological and hydrological features of the well, the chemical composition of its water, the drilling technologies employed, and the well's capacity as a mineral water source. Additionally, scientifically grounded recommendations for the exploitation and sustainable management of water resources are provided.

Location and geological conditions - the CHST44 well is located in the Khanabad district of the Andijan region, one of Uzbekistan's water-rich areas. This region is known for its abundance of natural resources and plays a crucial role in meeting the population's demand for drinking water. The well is managed by the organization **OOO "Water Life Mineral"**, which specializes in utilizing water resources, processing them through advanced technological methods, and supplying them to meet the needs of both the population and the economy.

The location of the CHST44 well, close to densely populated areas, makes its water resources invaluable for both drinking water supply and mineral water production. The high quality and mineralization level of the water enhance its therapeutic properties, turning it into a significant resource in the field of water management. Additionally, the well has the potential to contribute to the development of the local economy by supporting the production of mineral water.

During the drilling process, the geological layers of the well were thoroughly studied, and the soil composition was identified. These geological layers play a vital role in determining the quality of water resources, as each layer contributes to water filtration and flow regulation.

a) 0–91 meters depth this layer consists of large stones and gravel and is situated in the upper part of the well. Its primary function is to facilitate the natural flow of water and act as an additional natural filter to ensure water quality. The minerals within the stones and gravel naturally purify the water, enhancing its safety.

b) 91–97 meters depth this depth is composed of sand and gravel layers, which have both water-transmitting and filtering properties. These layers enable the efficient flow of water and improve the well's water extraction capabilities. Additionally, they enrich the water with minerals, enhancing its beneficial properties.

c) 97–110 meters depth the deepest part of the well is made up of another layer of large stones and gravel. This layer is essential for maintaining the natural pressure of the water and ensuring the stability of the geological structure. The density and strength of these stones guarantee the long-term reliability of the water resources and make the well suitable for prolonged use.

The geological structure of the CHST44 well ensures the production of high-quality and safe water. The upper layers of stones and gravel provide natural filtration, while the sand and gravel layers enable efficient water flow and increase mineralization levels. The dense stones in the deepest layer contribute to the mechanical stability of the well, making it ideal for long-term use. These geological features make the CHST44 well a highly suitable source for mineral water production.

The geological conditions of the CHST44 well ensure the production of high-quality and safe water. The bricks and stones in the upper layer of the well naturally filter the water, while the sand and gravel layers facilitate efficient water flow and enhance mineralization

levels. The dense stones in the bottom layer provide mechanical stability to the well, creating conditions suitable for long-term use.

Such geological features make the CHST44 well an excellent source for producing high-quality mineral water. These characteristics are essential for ensuring ecological sustainability in water resource utilization and expanding economic opportunities.

Opportunities for Mineral Water Production

1. Well Efficiency

The results of testing the CHST44 well demonstrate its high efficiency in water extraction. These tests were conducted to evaluate the quantity and quality of the water obtained from the well. The findings are as follows:

- Water Output: The well can supply 12 liters of water per second, indicating its ability to deliver a substantial volume of water continuously.
- Water Level Drawdown: During the water extraction process, the drawdown of the water level refers to the difference between the static (non-operational) water level and the dynamic (operational) water level in the well. In the CHST44 well, the water level decreased by only 2 meters during testing, reflecting its efficient performance and the sustainability of its water resources.
- Specific Water Yield: The well provides a specific water yield of 6 liters per second, showcasing its capability to supply water consistently and efficiently.

The ability to extract high volumes of water from this well is a crucial factor for establishing mineral water production. The stable flow and quality indicators make it an ideal source for both drinking and mineral water production.

The CHST44 well's efficient performance and geological characteristics position it as an essential resource for sustainable mineral water production. Its high water yield and reliable quality contribute to the development of both ecological and economic opportunities in the region.

2. Well Equipment and Recommendations

To enhance the technical capabilities and ensure the efficiency of the CHST44 well, the installation of modern equipment is recommended. The following steps should be undertaken:

Pump Type and Depth: It is advised to install a pump of type ETSV (ЭЦВ) 6-40-90 (refer to Figure 1) at a depth of 60 meters. This pump is designed to optimize water extraction from the well and ensure a consistent flow of water delivery.

The installation of such equipment will not only improve the well's efficiency but also contribute to the stable and sustainable management of water resources.

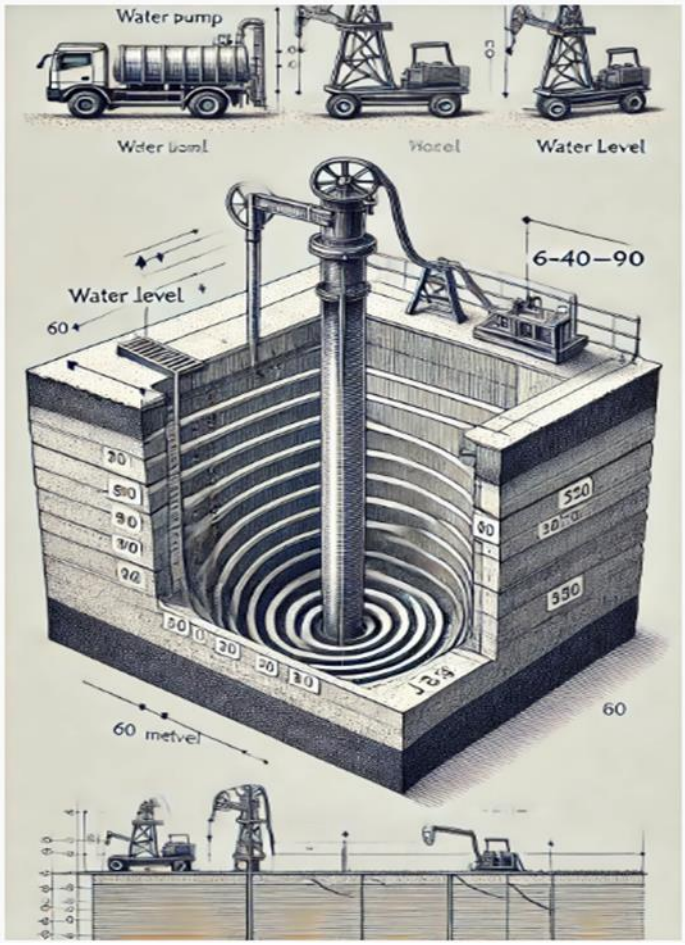

Figure 1. Technical Diagram of the ЭЦВ 6-40-90 Pump Placement and Operation in the Well

Equipment Compatibility: The recommended pump meets the technical specifications required for the well, ensuring stability and energy efficiency during the water extraction process. This, in turn, helps reduce operational costs and maximizes the efficient use of water resources.

The proper installation and operation of the equipment will enhance the efficiency of mineral water production and allow for the optimal utilization of resources.

The mineral water extracted from the CHST44 well possesses a range of beneficial properties for human health. Consuming this water positively impacts health and supports a healthy lifestyle.

Supports Bone and Dental Health: The hardness level of the water (5.0 mg/L) indicates the presence of calcium and magnesium, which play a vital role in strengthening bones and teeth. These minerals improve metabolic processes in the body and support the growth of bone tissue.

By incorporating these health benefits, the CHST44 well water can be effectively marketed and utilized for its therapeutic and daily consumption value.

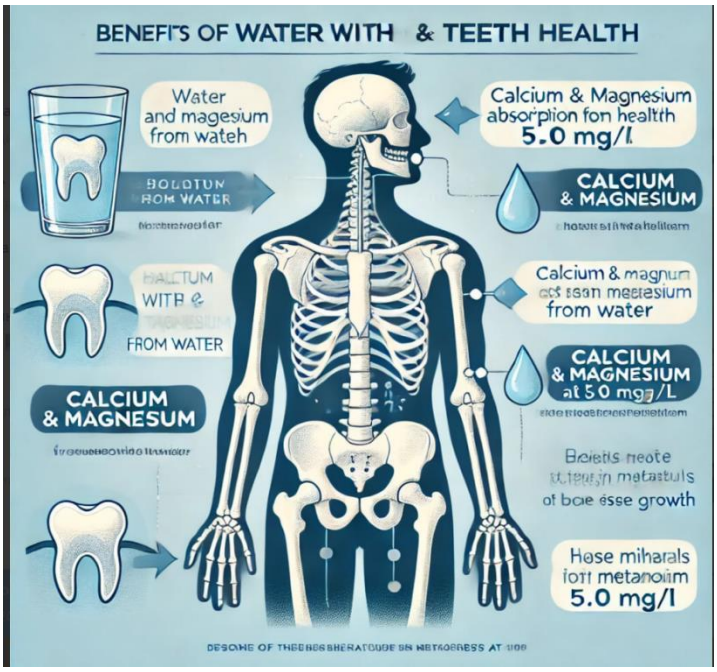

Figure 2. illustration of the benefits of calcium and magnesium in water for bone and dental health

the importance of water in improving gastrointestinal function

The pH level of 6.0 in water indicates its slightly acidic nature. This level is considered optimal for drinking water and positively influences various physiological processes in the body. Such a pH level supports the functioning of the gastrointestinal system and enhances its efficiency.

Water with a slightly acidic pH balance helps regulate the digestive environment, aiding in the absorption of

nutrients and improving the overall health of the digestive tract. Its beneficial properties contribute to maintaining an ideal internal balance and promoting overall well-being.

The slightly acidic nature of water helps maintain the pH balance of gastric juice, creating favorable conditions for food digestion. This balance allows for the efficient breakdown of food and the absorption of nutrients, ensuring the body receives the energy it needs.

Beneficial bacteria (probiotics) in the intestines thrive in a mildly acidic environment. The pH level of 6.0 in water supports this environment, promoting the stability of intestinal microflora. A balanced microflora plays a crucial role in protecting the body from pathogenic microorganisms and strengthening the immune system.

Water plays a central role in flushing toxins (harmful substances) from the body. When the pH level is 6.0, this detoxification process becomes more effective, aiding in the cleansing of the gastrointestinal system and contributing to improved overall health.

For individuals suffering from excessive stomach acidity, consuming slightly acidic water can help normalize gastric function. This not only protects the stomach lining from the effects of acid but also helps prevent various inflammatory conditions.

Water with a pH level of 6.0 offers numerous benefits for the gastrointestinal system. It enhances digestion, supports intestinal health, aids in detoxification, and helps regulate stomach acidity. These properties make such water highly beneficial for maintaining general health and well-being.

General Benefits

Healthy Metabolism: The pH level of water supports metabolic processes in the body by ensuring the efficient absorption of nutrients and minerals.

Energy Production: When nutrients are effectively absorbed in the intestines, the body's energy production processes are improved.

Promotes Overall Health: The efficient functioning of the intestinal system is vital for the health of other organs, including the liver and kidneys.

Water with a **pH level of 6.0** is highly beneficial for the gastrointestinal system. Consuming such water not only improves digestion but also supports overall health by aiding detoxification and strengthening the immune system. The unique properties of water from the CHST44 well make it an ideal choice for maintaining a healthy lifestyle.

The mineralization level of the water (**256 mg/L**) supplies the body with essential microelements such as calcium, magnesium, sodium, and others. These microelements are crucial for many biological processes in the body, including blood circulation, nerve impulse transmission, and proper muscle function.

The CHST44 well represents a significant source of mineral water with high potential. The chemical composition and physical properties of the water make it suitable for the production of high-quality drinking and mineral water. Developing such water resources in the region not only enhances drinking water supplies but also contributes to ecological sustainability and overall community well-being.

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